Wisconsin eHealth Care Quality and Patient Safety Board Information Exchange Workgroup

Final Report
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**THE INFORMATION EXCHANGE WORKGROUP OF
GOVERNOR DOYLE'S EHEALTH CARE QUALITY AND PATIENT SAFETY BOARD**

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EXECUTIVE SUMMARY

Health information technology (HIT), including electronic health records (EHR), and health information exchange (HIE), provide opportunities to improve quality, increase efficiency, and improve the return on investment in health care. These technologies also present opportunities to strengthen knowledge about disease, treatment, and the effectiveness of health care. To reach their full potential, these technologies must be implemented in a manner that assures consumers that electronic access to their personal health records will not compromise privacy or permit misuse.

The Information Exchange Workgroup recognized that Wisconsin has an existing set of health information services that uniquely position the state to leverage health information exchange. Nationally, single-physician practices represent approximately 38% of all practices, whereas in Wisconsin this number appears to be about 7% and shrinking. This suggests Wisconsin may be uniquely positioned for rapid growth in physicians' access to electronic medical record systems (compared to the national distribution of physician practice size).

Underlying Principles

The Information Exchange Workgroup agreed to endorse the Markle Foundation's Common Framework for guidance in establishing health information exchange technology and policy[1]:

a. Technology Principles
   i. It is preferable to implement a "Thin" network (defined as a simple client program or device designed to be especially small so that the bulk of the data processing occurs on the server), but for flexibility a hybrid or centralized data architecture may be needed to satisfy workflow or implementation requirements.
   ii. Avoid "Rip and Replace"
   iii. Separate Applications from the Network
   iv. Decentralization
   v. Federation
   vi. Flexibility
   vii. Privacy and Security
   viii. Accuracy

b. Policy Principles
   i. Openness and Transparency
   ii. Purpose Specification and Minimization
   iii. Collection Limitation
   iv. Use Limitation
   v. Individual Participation and Control

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[1] For further elaboration of Common Framework principles see
http://www.connectingforhealth.org/commonframework/#guide (accessed 10-6-06)

vi.   Data Integrity and Quality
vii. Security Safeguards and Controls
viii. Accountability and Oversight

Recommendations

1. Adopt the Markle Foundation's Common Framework guiding principles listed above.

2. Leverage existing assets for the utility functions that will be provided at the regional and/or statewide level through the examination of state resources and private initiatives for opportunities to further the adoption of both HIT and HIE. Significant work has been done through public and private enterprises to establish health IT infrastructure services that could accelerate deployment of health information exchange. The services include the ability to uniquely identify patients, extensive health information repositories to support both clinical care delivery and the state's public health mission, and groundbreaking public/private sector initiatives to establish an IT-enabled health care quality measurement infrastructure.

3. Expand broadband access to areas around the state through promotion of the BadgerNet Converged Network (BCN), which unites the separate data and video networks.

4. Drive HIT adoption and develop HIE simultaneously.

5. Conduct further analysis on possible tax breaks and incentives to ensure that small providers are not forced out of the exchange, and if provided, tie financing to adoption of products that are consistent with national requirements (i.e., Health Information Technology Standards Panel (HITSP) standards, Certification Commission for Health IT (CCHIT) certification) for emerging Wisconsin health information exchanges.

6. Promote HIT adoption among small and rural providers by:
   ▪ Promoting applications that are thin, complete EHR systems;
   ▪ Ensuring that costs associated with the exchange do not place an undue burden on small-volume facilities.
   ▪ Developing a means to assist these entities in interfacing with the exchange (funding and technical assistance);
   ▪ Allowing for a flexible flow of clinical information that does not force small hospitals into predetermined data exchanges where large hospitals and their outreach programs accrue the benefits.

7. Given the broad mix of hospital and physician practice HIT density in the state, as well as the unique health care delivery economics in the various rural and urban settings, facilitate and optimize health information exchange based on the needs of the local communities through the creation of Regional Health Information Organizations (RHIOs) – starting with information about allergies, medications, and diagnoses through a local/regional health information exchange.

8. Provide incentives such as startup funds or technical assistance to develop up to five
    RHIOs in Wisconsin (considering factors such as minimum populations served or
    organized consistent with existing medical trading area patterns[2]).

9. Require that all Wisconsin RHIOs meet minimum requirements including:
    ▪ Population served (at least one million people in the geographic area covered)
    ▪ Alignment with natural medical trading areas
    ▪ Willingness to serve all members of the communities in the designated area – cannot
      be vendor-driven or exclusive
    ▪ Independent with broad governance including both public and private sector
      representatives and strong consumer representation
    ▪ Administrative competency on EHRs.

10. Develop a set of statewide health information exchange services to:

    ▪ Serve as the link between RHIOs, other states, and the Nationwide Health
      Information Network (NHIN).
    ▪ Provide basic utility type services that are most effective at the state level and that can
      leverage existing state assets such as record location and user authentication services.
    ▪ Improve the ease, quality and effectiveness of state-hosted health information systems
      to exchange patient information with existing provider HIT systems.
    ▪ Provide basic patient information to providers that do not have access to a regional
      health information exchange.
    ▪ Provide practice guidelines/clinical decision support for health care providers.
    ▪ Provide a Web portal for consumers to obtain health education materials and practice
      guidelines.
    ▪ Research and resolve policy issues that are barriers to health information exchange.

11. Adopt hybrid architectural models in which some data is centralized and other
    information is stored at locations where care is provided. Data providers have a choice of
    maintaining constant access to their own data servers or allowing their data to be stored
    in a central location for retrieval. This model allows for the greatest flexibility for data
    providers. This will minimize the concerns related to trust and allow centralization for
    timeliness in accessing the information when needed.

12. Determine the preferred method for establishing master person/patient index to uniquely
    identify the correct patient with high accuracy, as a key to secure a uniform exchange, at
    the highest level possible. This will ensure the provider accesses the right information
    about the right patient, increasing confidence in the exchange and improving patient care.

13. Provide policies for auditing and security at the local level. These policies should ensure
    appropriate access is being provided at the local level; compliance should dictate when
    the organizations are to be included in the exchange. The workgroup noted that this may

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[2] The Dartmouth Atlas of Health Care in the Great Lakes States, http://www.dartmouthatlas.org/atlases/region4.pdf,
    accessed on October 31, 2006

result in a financial burden for small provider groups and clinics, but that it also allowed for more local control.

14. Focus security at the local level. The workgroup discussed the concept of imposing the most stringent security upon all participants in the exchange. Due to the challenge this could impose on small organizations, the group recommends further examination of how this is addressed in other states, with the assumption that the current HIPAA requirements would be the minimum security level.

15. Adopt the following phasing structure to accelerate clinical information exchange **access and use** by health care professionals near-term while recognizing and planning for incremental enhancements to both the breadth and depth of clinical information.

    Phase 1: Share Care Status Information: Includes clinical messaging of information like lab results, diagnostic imaging reports, discharge summaries, and correspondence including structured medical summaries available from clinical EMR systems to support transition or continuity of care among providers; enables shared views of encounters, results and medications from sources like pharmacy benefit managers, claims data, immunization summaries, etc.

    Phase 2: Share highly structured and standardized information for import/export by HIT applications including order entry, e-prescribing, patient-managed (PHR) information, and images.

    Phase 3: Advanced Clinical Support and Advanced Access Control: Extends information access control in more sophisticated ways (roles and context-sensitive access, patient-managed controls); and enables dynamic queries of structured information by clinical decision support systems and other applications (algorithms to improve safety, quality, value and public health protection).

    Phase 4: Collaborative Care, Active Quality Reporting and Health Surveillance: Deepen workflow-oriented collaborative services, such as e-visits, electronic referrals, and future generations of real-time interaction between clinicians, service providers, patients, public health, care managers, quality and safety initiatives.

16. Complete a more comprehensive survey of HIT in Wisconsin targeting a broader audience than the one completed by MetaStar in 2005 as a means of providing an accurate representation of statewide HIT adoption.

17. Based on recommendations from the Consumer Interests Workgroup and technology complexities associated with the current policy, the Information Exchange Workgroup suggests the following changes to state policy:

    a.   Allow redisclosure of patient information between providers for care purposes without explicit patient consent. Currently, if one provider sends patient information to another, the provider receiving that information cannot redisclose that information without explicit patient consent.

     b. Develop policy recommendations that address the need for health information exchange to support the need for parents, caregivers, and other patient advocates to facilitate the movement of health information as needed for those in their care.

     c. Give careful consideration to redesigning enforcement for special-protection data, such as mental health, HIV testing, etc.

18. Wherever possible, encourage the RHIOs to develop a mapping or card catalog method that would allow for segregation of health information and demographic information. Examples include the Connecting for Health Record Locator Service and the Integrating the Healthcare Enterprise (IHE) Cross-Enterprise Document Sharing (XDS) models.

19. Adopt standards and interoperability specifications developed by the Health Information Technology Standards Panel (HITSP) to facilitate the exchange of information across systems, and make these a condition for entities to participate in the HIE. Where possible, the state should use its ability to leverage its contracts for health care technology to promote the use of these standards and interoperability specifications.

20. Because health care technology and exchange are new concepts, develop infrastructure that is flexible, accessible, scalable, adaptable, and replicable. As part of this effort, employ open standards, so interoperable systems are designed. National policy should drive these standards, but if there is a need, develop additional standards at the state level.

21. Establish a multi-stakeholder panel to make recommendations to the Board regarding national health information exchange initiatives and their impact on the state's roadmap.

22. Promote e-prescribing as a visible, near-term example to consumers of how HIT can improve patient safety, convenience, and consumer empowerment, and leverage its use to accelerate broader HIT adoption in the ambulatory care setting.

Next Steps

The Information Exchange Workgroup made significant progress towards its assignments. As implementation activities begin, it will be necessary to consider the following activities:

- Finalize recommendations on architectural requirements.
- Identify a minimum set of standards to support recommendations and an initial set of business opportunities for the advancement of HIT.
- Continue to monitor and coordinate activities with the Nationwide Health Information Network pilot program, related HITSP interoperability, and other national efforts that may influence ongoing HIE technology planning and implementation.
- Continue to identify and promote use of appropriate existing state information technology assets to increase the value of information exchange for both private and public sector health care delivery.
- Continue discussion of the role of the patient in accessing his/her own health information.
- Prioritize the use cases developed by the Patient Care Workgroup that would have the most impact and create technical requirements for their implementation.

- Establish criteria for a qualitative analysis of the HIT density indicators, such as levels of system adoption.
- Expand the HIT density study to include:
  a. Indicators to include additional HIT systems.
  b. All hospitals in Wisconsin.
  c. Out-of-state hospitals, in order to determine whether the Wisconsin experience is characteristic or anomalous.
- Expand the HIT density study to determine status of HIT linkages between rural hospitals and public health immunization registries and other population health initiatives.

BACKGROUND

Governor Jim Doyle created the eHealth Care Quality and Patient Safety Board by Executive Order 129 on November 2, 2005. The eHealth Board is charged with developing the *Wisconsin eHealth Action Plan*, Wisconsin's five-year plan for the adoption and exchange of interoperable electronic health records. Five workgroups were formed to guide development of this plan: Patient Care, Information Exchange, Consumer Interests, Governance, and Financing.

The Information Exchange Workgroup is particularly concerned with assuring Wisconsin's *eHealth Action Plan* defines a technical framework for health information exchange (HIE) that enables interoperability between a variety of health information technology (HIT) systems and takes into consideration the operating policies and technology standards currently being developed by the multi-stakeholder American Health Information Community (AHIC) and coordinated by the Department of Health and Human Services, Office of the National Coordinator for HIT.

The Information Exchange Workgroup is charged with proposing:

- An interoperable technical infrastructure that will meet clinical care requirements and result in real-time electronic health information exchange;

- Methods to link medical information to public health information initiatives to create an effective, efficient means for the delivery of health care and public health;

- A system that will enhance and facilitate the use of patient care data for use in appropriate public health surveillance, outbreak detection and trending, and health protection efforts; and

- Products and processes responsive to consumer interests.

This document discusses the issues and provides the Information Exchange Workgroup's recommendations on these assignments.

RECOMMENDATIONS

> **CHARGE 1:** Discuss and document different options/examples of technical architectures used by health information exchanges and the best uses of each.

To gain an understanding of the activities occurring at the state level, the Information Exchange Workgroup began their discussion of technologies through selected presentations about activities occurring across the state. Based on this information, the Workgroup recognized that Wisconsin has an existing set of health information services that uniquely position the state to leverage health information exchange. Significant work has been done through public and private enterprises to establish health IT infrastructure services that could accelerate deployment of health information exchange. These services include the ability to uniquely identify patients, extensive health information repositories to support both clinical care delivery and the state's public health mission,

and groundbreaking public/private sector initiatives to establish an IT-enabled health care quality measurement infrastructure.

With this knowledge, the Workgroup examined best practices in health information exchange from other states, and lessons learned from the Nationwide Health Information Network (NHIN) pilot program to identify significant and relevant technical issues for consideration in developing the Workgroup's recommendations.

1.1 Infrastructure Options for Health Information Exchange

The Information Exchange Workgroup discussed the following general models Wisconsin could use to establish health information exchange infrastructure:

1. Centralized – a centralized model is one in which all the health information of a community is located within one central location. Although this model allows for easy access to all of the data, it raises some concerns about privacy and security, because a breach could compromise all health information about a person and a community. A centralized model also requires substantial IT investment and maintenance, but it may improve information retrieval time and support data aggregation services for local use, such as supporting public health or quality reporting. This model may also be beneficial in aggregating bulk health information that is not necessarily provided in a clinical context (such as a list of medications) or where there is less health information technology density in a local geographic area (requiring the assembly of information into a usable context for clinicians).

2. Federated – a federated model is one in which health information is stored where care is provided. This model can allow for more control over access to the information, is less expensive due to the minimal processing and storage resources required, but has additional complexity in managing information requests across the various systems that may hold a patient's health information. With this model, a lightweight infrastructure is created that enables information about individual patients to be tapped from any location. This model requires the commitment of each data provider to 24-hour, 7-day-a-week data access and to ensuring the translational services or standards-based interoperability interfaces to permit cost-effective information exchange across disparate systems. To ensure proper identification of patients, even a federated model must gather and store certain types of demographic information to create a community Master Patient Index or use an algorithm that allows for a patient to be identified with a high level of accuracy.[3]

3. Hybrid – a hybrid model is one in which some data is centralized and other information is stored at locations where care is provided. Data providers have a choice of maintaining constant access to their own data servers or allowing their data to be stored in a central location for retrieval. This model allows for the greatest flexibility for data providers.

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[3] Muller, Doug; Taking the Configuration Management Database to the Next Level: The Federated Data Model; Computer World, http://www.computerworld.com/databasetopics/data/story/0,10801,101081,00.html , accessed November 6, 2006.

Hybrid models are becoming popular, because many geographies have a mix of providers, ranging from those with very limited to those with very extensive HIT capabilities.

Regardless of the model of data storage and retrieval, data providers retain ownership of data, may withdraw their participation (and data) at will, and are responsible for the quality of their own data, unless there are specific conditions set up for alternate arrangements.

Independent of the architectural model deployed regionally, current analysis at the national level is focusing on the data exchange mechanisms that optimize clinician workflow, such as the ability to exchange information between two or more providers, using store-and-forward or publish-and-subscribe methods, described below:

- In the store-and-forward method, a copy of specific health information is sent to an intermediate storage location where it is kept and sent at a later time to the location that needs it. The validity of the data is confirmed before it is sent on to another location. This is typically used for results delivery when services are provided through another organization. Using this method, a copy of specific health information (such as a lab report) from a hospital's records would be sent to a centralized repository that serves as the hub for transmission of the health data for the region. As the information enters this repository, it is verified against known standards and established formatting requirements for that organization.

- The publish-and-subscribe method allows "subscribers" to include parts of "published" documents within their systems. As changes are made to the original published document, subscribers would be notified and have the ability to update their information. In this method, a health care facility is able to subscribe to a patient's record, and receive updates whenever changes are made.

1.2 Infrastructure for Health Information Exchange

The extent of electronic health records adoption within the United States varies substantially. The latest data from the National Ambulatory Medical Care Survey (NAMCS) conducted by the Centers for Disease Control and Prevention (CDC) indicates one-quarter of office-based physicians in the United States reported using fully or partially electronic medical record systems in 2005. Based on more specific questions about the features of the electronic medical systems employed, it was determined only one in ten of the physicians surveyed use a complete electronic health record that included functions like ePrescribing and importation of laboratory results.[4] The Wisconsin Medical Society reported to the Workgroup that 67% of Wisconsin physicians are in large group practices of 50 or more physicians,[5] suggesting the adoption of electronic health information technology and exchange among providers may be more advanced in Wisconsin than in other states. Nationally, single-physician practices represent approximately 38% of all practices, whereas in Wisconsin this proportion appears to be about 7% and shrinking. See Table 1.

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[4] CDC, National Center for Health Statistics, Electronic Medical Record Use by Office-Based Physicians: United States, 2005. http://www.cdc.gov/nchs/products/pubs/pubd/hestats/electronic/electronic.htm
[5] Based on the Wisconsin Medical Society database of physicians, November 2006.

Table 1. Practice Size Distribution, Nationally and Wisconsin

Practice Size	Wisconsin[6]	Nationally[7]
Single-physician practices	7%	38.5%
Two-physician practices	13%	11.3%
3-5 physician practices	2-9 physicians	25.4%
6-10 physician practices		12.9%
11 or greater	80% 10-49 - 13% 50-100 - 7% >100 - 60%	9.7% .
Unknown	-	2.2%

This suggests Wisconsin may be uniquely positioned for rapid growth in physicians' access to electronic medical record systems (compared to the national distribution of physician practice size). A Wisconsin survey is in progress to identify the adoption rates of office-based electronic health information technology and exchange, which will provide the Workgroup with more information to refine the model adopted in Wisconsin.   It should be noted the use of an EMR does not necessarily indicate that data can be imported or exported in a structured, standardized manner from that application. Most older products and many still marketed today lack that capability although recently, several applications were certified as meeting some minimal interoperability standards.[8] The Certification Commission for Health Information Technology (CCHIT), a voluntary, private-sector organization to certify HIT products, has inspected HIT products based on functionality, interoperability, and security. CCHIT is initially focusing on ambulatory EHRs for the office-based physician or provider, inpatient EHRs for hospitals and health systems, and the network components through which they interoperate and share information. CCHIT was recently recognized by the U.S. Secretary of Health and Human Services as a recognized certifying body, which adds credibility to the applications certified by this entity for current and future DHHS regulations.

The Workgroup also conducted a high-level survey of hospital HIT adoption in Wisconsin. Overall, the state has well-established, integrated health care delivery networks with extensive key HIE infrastructure in place. However, the Workgroup noted that while rural hospitals in Wisconsin are investing in HIT, limitations in both capital and IT staff resources are limiting actual deployment.

Key findings of an informal survey about HIT adoption conducted by the Rural Wisconsin Health Cooperative in collaboration with Gundersen Lutheran, of the 30 rural hospitals that participated (representing 22% of all Wisconsin hospitals), included:

- Every hospital has a core Master Patient Index (MPI)/database;
- Over 80% of respondents indicated adoption of electronic pharmacy, lab, and radiology systems;
- Few hospitals have interface engines, which may hinder participation in HIEs that require integration with multiple standards. Interface engines are defined as a software program designed to simplify the creation and management of interfaces between application systems. They are members of a class of software products called "middleware" that relieves applications

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[6] Dr. Susan Turney, Wisconsin Medical Society, November 7, 2006, personal correspondence, based on the Wisconsin Medical Society database of Society members and all physicians in the state.

[7] Robert Wood Johnson, Health Information Technology in the United States: The Information Base for Progress, 2006, http://www.rwjf.org/files/publications/other/EHRReport0609.pdf, accessed November 7, 2006.

[8] http://cchit.org/certified/products.htm

and their systems-level communications substructure of the responsibility for owning and managing the functions of integration.

The conclusions from this survey include (as noted in Attachment 2):

1. There is significant density of HIT adoption in RWHC member hospitals, perhaps more than expected, given their size.
2. HIT adoption is increasing, as many study participants noted plans for 2007 implementations that are not reflected in this report.
3. The integrated single vendor model seems to be especially successful for smaller hospitals.
4. There is low interfacing engine adoption even in high HIT density facilities (without exception, integrated model facilities do not own interface engines).
5. Avoiding the complexities of interfacing by using an integrated strategy may be a key way that smaller hospitals succeed in expanding their HIT adoption to advanced patient safety systems.
6. The service volume of an organization is not necessarily predictive of HIT adoption until you look at the lowest-volume facilities.
7. Affiliation with a larger organization is not predictive of HIT adoption, though organizations with the fewest HIT systems implemented tend to be independent.
8. Low volume—particularly low-volume unaffiliated—organizations may need help implementing EHR systems.

HIT adoption among these hospitals is greater than anticipated given their size, and adoption does not appear to be associated with affiliation with a larger organization. The full report, including policy recommendations, is included in Attachment 2.

Because health information technology and exchange are evolving concepts, the infrastructure developed needs to be flexible, accessible, scalable, adaptable, and replicable. As part of this effort, open standards reflecting national direction should be employed to the extent possible, so interoperable systems can be designed. These standards will likely be developed and driven at the national level by AHIC-associated efforts, but if necessary, other standards may need to be addressed at the state level.

1.3 Regional Obligations in the Exchange

Given the broad mix of hospital and physician practice HIT density in the state, as well as the unique health care delivery economics in the various rural and urban settings, the Workgroup concluded health information exchange is best facilitated and optimized based on the needs of local communities. This is the growing trend in the United States;[9] these regionally managed exchanges (often referred to as a Regional Health Information Organization - RHIO) can help competing regional stakeholders organize electronic health information exchange. A RHIO is an independent corporation that operates an exchange of clinical health information among competing stakeholder

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[9] eHealth Initiative; Improving the Quality of Healthcare through Health Information Exchange; Selected findings from eHealth Iniative's Third Annual Survey of Health Information Exchange Activities at the State, Regional, and Local Levels; http://toolkits.ehealthinitiative.org/assets/Documents/eHI2006HIESurveyReportFinal09.25.06.pdf; accessed on October 31, 2006

organizations supporting multiple use cases. A regional health information network (RHIN) is the health information exchange system operated by the RHIO.[10] A RHIO is the organization through which most HIE services are selected, developed, and delivered (although technical implementation might be performed by contracted third parties). The mix of services selected will depend on the local use cases and business cases judged to lead to a sustainable business model.

Such organizations tend to be more stable and are likely to be self-sufficient at the level of the medical trading area (MTA), the natural market within which most referrals, hospitalizations, and other flows of both patients and patient information typically occur. It is an area in which clinicians and health care organizations work together to serve a population of consumers, and where working relationships have typically already been established in serving common patients. The MTA is the geographic area in which face-to-face trust can most readily be established and within which the bulk of information is currently exchanged (usually on paper) on a daily basis.[11] These regions could be further developed to establish RHIOs, as they indicate natural areas of care coordination. The Dartmouth Atlas of Health Care in the Great Lakes States provides information on hospital referral regions (Figure 1).[12]

Figure 1. Dartmouth Great Lakes Hospital Referral Regions (Map J)

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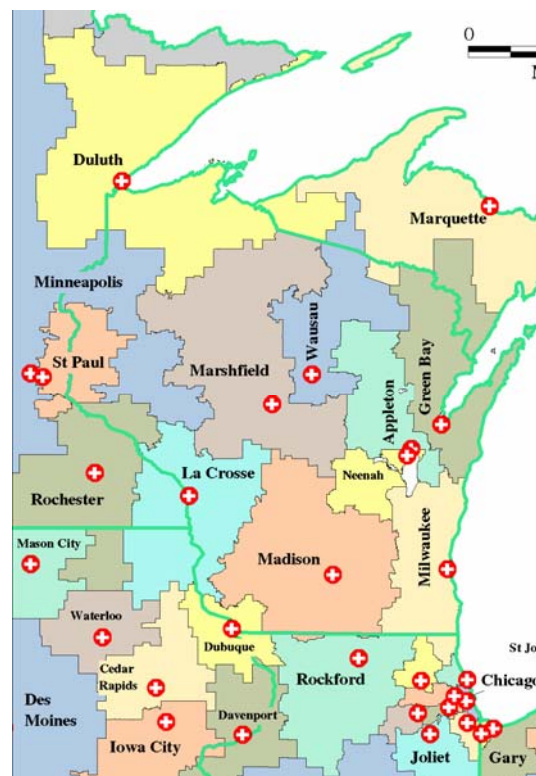
[10] Gartner Health Care; U.S. Clinical IT Initiatives: A Hype Cycle; 13-16 November 2005; The Hyatt Regency Grand Cypress; Orlando, Florida.

[11] Arizona Health-*e* Connection Roadmap, http://gita.state.az.us/tech_news/2006/Arizona%20Health-e%20Connection%20Roadmap.pdf , accessed on October 31, 2006.

[12] Dartmouth Atlas of Health Care in the Great Lakes States, http://www.dartmouthatlas.org/atlases/region4.pdf, accessed on October 31, 2006.

The state should encourage the development of RHIOs to establish and implement HIE architectures that meet regional market needs, and that conform to national operating policies and technology standards established by the Office of the National Coordinator. Regional HIEs potentially could use common infrastructure components provided at a statewide level, such as a master person index or authentication method, based on availability of existing state IT assets or ease of implementation.

Based on the Dartmouth Atlas referral patterns (Figure 1, above) there are a number of possible configurations for RHIOs in Wisconsin, ranging from a minimum of 3 to up to 10, assuming that a RHIO should serve a population of at least one million people to be economically viable. The Workgroup recommends establishing between three and five RHIOs (each serving at least 1 million people) to cover Wisconsin.

A distributed network with most data residing in the systems of the data owners has been proposed. Some data providers (larger, more technically proficient organizations) may prefer to store and make data available directly from "edge servers," a server located at a point near the end users, on their own networks. However, many provider organizations may not have the capability to respond to data requests in the timely and consistent fashion necessary to provide information at desired speed. Furthermore, delays from querying large number of source systems may degrade the speed with which results are presented to clinical users. Such delays may lead to abandonment of the exchange by busy clinicians and their patients.

The state exchange should provide and enforce policies for security and auditing at the local level. These policies should ensure that appropriate access is being provided at the local level. Participation in the exchange should be dependent on compliance with these policies. The Workgroup noted this might result in a financial burden for small provider groups and clinics, but the need to assure patients of security and confidentiality is absolute. Due to the many recommendations being proposed by the Information Exchange Workgroup for the security and auditing functions at a local level, there is some concern that small provider groups and clinics may be disadvantaged in participating in the exchange. Due to these concerns, the Workgroup recommended further analysis be conducted on possible tax breaks and incentives to ensure small providers are not forced out of the exchange. The Workgroup recommended the current HIPAA requirements be adopted as a minimum threshold for the local organizations as they implement the security and auditing pieces of the exchange.

Finally, the statewide infrastructure should work with existing electronic health information data sources as much as possible to minimize disruptions to the state's health care industry. As noted, this infrastructure needs to remain flexible and nimble in an effort to adapt as the Wisconsin model for HIT and HIE is refined.

1.4 State Level Obligations in the Exchange

Although RHIOs are most likely to be regional (sub-state or potentially even interstate in areas where referrals frequently cross state lines), there is also a role for a statewide services provider whose customers are primarily regional HIEs both inside and outside of Wisconsin and providers not associated with a regional exchange. Economies of scale and availability of state-led

capabilities (e.g., Medicaid, Immunization Registry) favor centralizing certain business functions at a state level.

The Workgroup recommends that in Wisconsin a statewide organization (especially one that includes state government as an active participant) provide the following services or functions:

- Assure and assist regional HIEs to use common standards for data transmission, vocabulary and other key functions to permit exchange of information between and beyond Wisconsin HIEs as needed.
- Leverage existing or future statewide information systems or data sets to help regional HIEs implement foundational infrastructure, such as a secure user identity management, master patient indexing, or record locator services. For example, a state licensing and registration system could be used to help validate clinical users, or the various state IT investments to improve master client index services in the department of motor vehicles operations, eligibility determination for benefits, and the immunization registry could be leveraged to enable a robust regional master patient index service.
- Leverage HIE by facilitating the availability of individually identifiable health information data sets created and/or used by state government or other statewide entities (for example, immunization and disease registries, Medicaid claims information) to health care providers and RHIOs. Access to such information could be obtained by purchase, by policy, or a combination of the two.
- Obtain and provide (benefited by larger-scale purchasing power) data sets created by national or other large-scale organizations (for example, national laboratories or the RxHub pharmacy benefit data hub). Access to such information could be obtained by purchase, by policy, or a combination of the two.
- Manage requests for information between regional HIEs, for example, when a patient requires care outside the home region and the provider seeks historical information.
- Manage interactions between regional HIEs, other states, and the NHIN.

Rural and small hospitals are in a unique position, as a report by the Santa Barbara Data Exchange reports positive returns for health information exchange in all except small communities (e.g., one hospital and less than 100 physicians).[13] As a result, the Information Exchange Workgroup recommends that at the state level, promotion of HIT among small and rural providers includes:
- Promoting applications that are thin, complete EHR systems;
- Ensuring that costs associated with the exchange do not place an undue burden on small-volume facilities.
- Developing a means to assist these entities in interfacing with the exchange (funding and technical assistance);
- Allowing for a flexible flow of clinical information that does not force small hospitals into predetermined data exchanges where large hospitals and their outreach programs accrue the benefits.

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[13] Santa Barbara Data Exchange, *Moving Toward Electronic Health Information Exchange: Interim Report*, 2003

> **CHARGE 2:** Identify technical options and their advantages and disadvantages for a statewide electronic health infrastructure.

2.1 Acceleration of Health Information Technology (HIT) Adoption

The Workgroup focused primarily on Health Information Exchange, as opposed to Health Information Technology adoption within organizations.   The rationale for this includes:

- The business case for HIT adoption and installation is greatly strengthened by the availability of standardized electronic data that can be imported and exported from such technologies. HIE is the most promising path to such standardized data, and thus would increase HIT adoption;
- HIT may have limited power to improve care if comprehensive patient health information assembled from multiple originating sources (like laboratories) is lacking;
- HIT adoption and installation needs to be part of the internal business logic of individual health care organizations.
- The detailed surveys of HIT use in the office and inpatient settings should be completed in order to determine the policy options to accelerate adoption.

The availability of standardized information feeds from an HIE and the certification of interoperable applications are likely to accelerate adoption of technology in the practice setting. Although many early users may receive HIE information by fax or other technologies, it is critical the data be increasingly standardized over time, so it can be imported and exported automatically and used within electronic medical records and other applications (such as clinical decision support). Similarly, it is important clinicians and others continue to invest in electronic medical records and other forms of HIT certified to meet interoperability goals.

The Information Exchange Workgroup recognizes that the patient safety and efficiency benefits of health information exchange depend in large part on significant HIT adoption by a broad range of stakeholders, including small physician practices and rural hospitals.   These organizations tend to have the hardest time implementing HIT, primarily because their low transaction volumes make the business case for HIT adoption more elusive. Therefore, the Workgroup recommends that Wisconsin conduct further analysis of possible tax breaks and incentives to ensure that small providers are not forced out of the exchange, and if funding is provided, tie it to adoption of products that are consistent with requirements (i.e., HITSP standards, CCHIT certification) of emerging Wisconsin health information exchanges. This will ensure that the HIT adopted will interoperate with emerging Wisconsin health information exchanges.

E-prescribing is one area of HIT adoption Wisconsin should examine to ensure its timely roll-out to meet the April 1, 2009, implementation deadline set forth by the Medicare Modernization Act of 2003. Wisconsin should determine how e-prescribing implementation can help accelerate broader HIT adoption in the ambulatory care setting.

2.2 Guiding Principles for Health Information Exchange

The Information Exchange Workgroup agreed to endorse the Markle Foundation's Common Framework for guidance in establishing health information exchange technology and policy[14]:

a. Technology Principles
   i. It is preferable to implement a "Thin" network, but for flexibility a hybrid or centralized data architecture may be needed to satisfy workflow or implementation requirements (e.g., data retrieval time; data providers' inability to have 24/7 system access; data searching capability; etc.).
   ii. Avoid "Rip and Replace" – the network should take advantage of the technology currently in use.
   iii. Separate Applications from the Exchange - the roles of the exchange and of applications should be distinct; the purpose of the exchange is to exchange data that might be used in different types of applications (consistent with data use agreements)
   iv. Decentralization – data ownership and quality management remain with the data provider
   v. Federation—data exchange is based on voluntary federation defined by clear agreements
   vi. Flexibility – allow any hardware or software to connect to the network as long as it meets certain minimum requirements
   vii. Privacy and Security – involves the establishment of appropriate requirements for patient privacy, security, confidentiality, integrity, audit, and informed consent
   viii. Accuracy – a low tolerance for errors with regard to identifying people and matching their data records

b. Policy Principles
   i. Openness and Transparency - consumer should be able to know what information exists about its purpos, who can access and use it, and where it resides
   ii. Purpose Specification and Minimization - the purposes for which personal data are collected should be specified at the time of collection, and subsequent use limited to those purposes
   iii. Collection Limitation - personal health information should only be collected for specific purposes and should be obtained by lawful and fair means
   iv. Use Limitation - personal data should not be disclosed, made available, or otherwise used for purposes other than those specified
   v. Individual Participation and Control - consumers should be able to control access to their personal information except where defined by law. Ideally exchange creates greater, not fewer, opportunities to tailor information use to consumer desires.

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[14] For further elaboration of Common Framework principles see
http://www.connectingforhealth.org/commonframework/#guide (accessed 10-6-06)

vi.   Data Integrity and Quality - all personal data collected should be relevant to the purposes for which they are to be used and should be accurate, complete, and current

vii.   Security Safeguards and Controls - personal data should be protected by reasonable safeguards against such risks as loss or unauthorized access, destruction, use, modification, or disclosure

viii.   Accountability and Oversight - entities in control of personal health information must be held accountable for implementing these principles

ix.   Remedies - legal and financial remedies must exist to address any security breaches or privacy violations

These principles played a key role in the discussion of architecture frameworks. The framework selected should incorporate these principles.

2.3 Standards

A key concern raised throughout all the discussions held by the Information Exchange Workgroup was the need to establish and use standards. The Workgroup recognized many standards currently exist and further work needs to be done to select the standards to use. Additionally, the Workgroup recommended adopting all standards in development at the national level as Wisconsin develops its HIE architecture.

The Information Exchange Workgroup recommends the HIE (both regional HIEs and the statewide HIE) use non-proprietary standards and interoperability specifications selected by the U.S. Department of Health and Human Services, the Health Information Technology Standards Panel (HITSP), [15] Certification Commission for Health IT, National Committee on Vital and Health Statistics (NCVHS) Nationwide Health Information Network Functional Specifications, and Public Health Information Network, or standards specified by well-established integration organizations (e.g., Integrating the Healthcare Enterprise (IHE) or that originate from recognized standards development organizations (e.g., HL7, OASIS, DICOM). Non-standard or proprietary architectures should not be developed or promoted unless there is no recognized standard to accomplish the intended data exchange.

2.4 Incremental Adoption

Although the Wisconsin vision is to have the ability to use electronic health information technology and exchange in every health care facility, it is recognized this will be achieved through incremental steps that would gradually provide more tools to improve patient safety and the quality of care as the state progresses to a fully interoperable health information environment.

The Patient Care Workgroup of the eHealth Board identified a summary view of information (current and historical) pertaining to a patient, from all sources of care, as a top priority for

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[15] For more information about the HITSP Interoperability Requirements for Consumer Empowerment Case

development over the five-year horizon of Wisconsin's *eHealth Action Plan* (as displayed below).

Type of Data
Identity/demographics
Diagnoses/encounter diagnoses
Medications
Allergies
Labs/other diagnostics (results reporting)
Procedures
Immunizations
Patient visits and hospitalizations
Discharge summaries/progress notes
Patient contact-in-emergency
Advance directives
Payer/insurance coverage/eligibility

The Consumer Interests Workgroup suggested the addition of 'medical devices' such as pacemakers, hearing aids, and implants to the high priority EHR/HIE data elements identified by the Patient Care Workgroup. This is an area where standards are emerging as the industry addresses information management challenges associated with home health monitoring. Additionally, the Patient Care Workgroup recommended assessing emerging standards for the continuity of care record, which is implemented as part of the AHIC consumer empowerment use case, using the harmonized clinical content standard HL7/ASTM Continuity of Care Document.

In response to these recommendations and consistent with national guidelines, the Information Exchange Workgroup recommends Wisconsin focus on HIE solutions that accelerate clinical information exchange access and use by health care professionals near-term while recognizing and planning for incremental enhancements to both clinical information breadth and depth.[16] The following is a phasing structure Wisconsin can use to achieve these goals.

1. Phase 1: Share Care Status Information: Includes clinical messaging of information like lab results, diagnostic imaging reports, discharge summaries, and correspondence including structured medical summaries available from clinical EMR systems to support transition or continuity of care among providers; enables shared views of encounters, results and medications from sources like pharmacy benefit managers, claims data, immunization summaries, etc.

2. Phase 2: Share highly structured and standardized information for import/export by HIT applications including order entry, e-prescribing, patient-managed (PHR) information, and images.

3. Phase 3: Advanced Clinical Support and Advanced Access Control: Extends information access control in more sophisticated ways (roles and context-sensitive access, patient-
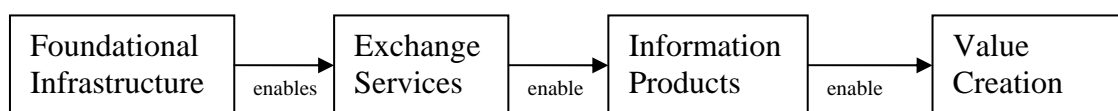
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[16] Modified from HIMSS-EHR Vendors Association Interoperability Roadmap, http://www.himssehrva.org

managed controls); and enables dynamic queries of structured information by clinical decision support systems and other applications (algorithms to improve safety, quality, value and public health protection).

4. Phase 4: Collaborative Care, Active Quality Reporting and Health Surveillance: Deepen workflow-oriented collaborative services, such as e-visits, electronic referrals, and future generations of real-time interaction between clinicians, service providers, patients, public health, care managers, quality and safety initiatives.

For the purposes of this report, the following nomenclature will be used:

Foundational Infrastructure	enables →	Exchange Services	enable →	Information Products	enable →	Value Creation

Exchange services are the core product of a regional HIE. These services make the flows of clinical information between different organizations possible. However, exchange services cannot be offered unless the HIE has also created an appropriate level of *foundational infrastructure* for those services. For example, such infrastructure at the most elementary level must include appropriate policies, procedures and data use agreements, user management, and secure networks. Higher levels of exchange services may require data standardization or community Master Patient Indexes.

Exchange services in turn can be used to create *information products*, the forms in which clinicians, patients, and other stakeholders actually obtain, see, or use information provided by the exchange. Information products are based on information provided through exchange services, but they may ultimately be delivered to users by three different types of entities: the HIE itself (e.g., in the form of a portal providing access to a particular information view); by HIE participants who buy, lease, or build compatible end-user applications (e.g., electronic medical record system); or by third parties who use exchange services to create additional products for HIE participants (e.g., an e-prescribing service provider). *Value creation* occurs when information products reduce costs, improve quality and safety, or otherwise improve the functioning and outcomes of health care to the benefit of HIE stakeholders.

In general, a given level of foundational infrastructure can enable the production of several different types of exchange services. Each exchange service enables many different information products, and each information product can create several types of value, so each additional element creates a cascade effect moving from left to right across the diagram above.

As noted, the exchange services offered by any particular regional HIE need to be based on local needs, data availability, and sustainable business models. Services most likely to be offered first in a given region are those that:

- Are technically feasible;
- Fall within the information-sharing willingness and trust of major stakeholders (including patients);
- Enable desired information products and value creation; and

- Can create value via revenue generation or improved transaction efficiency to sustain ongoing operation and future expansion of services.

The Patient Care Workgroup working in collaboration with the Information Exchange Workgroup defined a series of early services that could be implemented by regional HIEs. The following describes the rationale for pursuing an incremental approach.

More sophisticated services require more sophisticated data handling, and as a result, require more sophisticated data sharing agreements, data management architecture and technology. In other words, additional layers of foundational infrastructure are required. Some foundational infrastructure is prerequisite for all exchange services, while other foundational infrastructure is required only to create more complex exchange services.

Regional HIEs can develop exchange services (and the foundational infrastructure they require) incrementally, or they can try to establish high-level comprehensive services simultaneously. They might achieve the latter using multi-service solutions from vendors offering sophisticated platforms in a single integrated offering. However, at present, the number and experience of vendors offering proven "turnkey" solutions for multiple services are limited. Also, the complexity of implementation, training, and impact on clinical workflow argues for incremental development of services rather than rolling out multiple services simultaneously. Additionally, accelerating changes in creating national standards for HIT interoperability also add significant risk in using a proprietary turnkey solution. Finally, the business case to sustain some exchange services (the benefit-to-cost ratio for stakeholders who must invest in implementation and pay for ongoing operations) is not clear for every type of service at this time. Thus an incremental approach develops key foundational infrastructure and economically sustainable exchange services in a logical stepwise fashion, which explains why some highly desired information products services might need to wait until after earlier, simpler developments are complete. This incremental approach creates efficiencies through private/public sector collaboration.

CHARGE 3: Complete an inventory of existing state technical infrastructure resources to increase the understanding of what infrastructure resources can be leveraged.

The Workgroup has begun to identify existing state infrastructure opportunities. Listed below are a few of Wisconsin's resources with potential for being leveraged in the development of this system:

Public
Wisconsin has a substantial investment in its information technology infrastructure:
- The Wisconsin Immunization Registry (WIR) already has over 4.3 million individuals entered, and uses a Master Person Index (MPI). This system has been modified for use in other states.
- The Client Assistance for Re-employment and Economic Support (CARES) system used for determining eligibility for a number of entitlement programs in Wisconsin uses an MPI across the Medicaid, FoodShare, Child Care, and Wisconsin Works programs to uniquely identify the clients served by these programs.
- There is an opportunity to eliminate redundancy in the development and use of a MPI for the many state agencies that require a master person index. Specifically, state investment in

homeland security may provide additional value to the health care market, by providing a robust means of user authentication / identity verification as part of the health information exchange security services.

- The Wisconsin Cancer Registry, with reporting about cancer cases to be available in an aggregate, de-identified manner.
- Surveillance infrastructure for lead poisoning, fatal and nonfatal injury, asthma, infectious disease, child obesity, smoking, and alcohol.
- The Public Health Information Network, PHIN, which will provide statewide and community-level population data needed for community health status assessment, policy development, assurance, service delivery, resources management and accountability. Over $11 million has been allocated over 7 years to develop Wisconsin's PHIN and integrate applications. This work has focused on portal functions - secure login, role-based access, user directories, collaboration tools (calendar, email groups, survey tools), GIS; Analysis, Visualization, and Reporting (AVR) / SAS Business Intelligence (BI); preparedness, HL7 messaging / electronic laboratory reporting, communicable disease, environmental health and injury surveillance, Maternal and Child Health (MCH) service delivery and surveillance.
- The Medicaid ER Query developed to share Medicaid claims data with emergency rooms.
- BadgerNet, which could be employed to provide statewide broadband access.

Private
- Wisconsin Health Information Organization (WHIO) development of a multi-payer claims database.
- Regional Health Information Organization (RHIO) development occurring in Southeast Wisconsin through the Wisconsin Health Information Exchange (WHIE).
- Wisconsin Electronic Medical Record vendors, such as GE Healthcare and Epic Systems Corporation.
- Wisconsin Medical Society's planned Physician Information Repository.

One key component of the exchange of information is a reliable broadband connection. In Wisconsin, there are still areas within the state that do not have Internet access. To address this fundamental concern, the Workgroup recommends expanding broadband access to areas around the state through promotion of the BadgerNet Converged Network (BCN), which unites the separate data and video networks. "The objective of this project is to provide dynamic, scalable bandwidth on a vendor-managed network to approximately 2,000 data and/or video sites including state agencies, schools, universities/colleges, and other authorized users (e.g., municipalities) with the option for customers to request an increase in bandwidth at a later date, if needed."[17] While there is still a sliding-scale fee associated with this service, it could provide the needed technical infrastructure to support electronic exchange across the state.

Another key component of the exchange of information is ensuring that only information on the "correct" individual is exchanged across the system after a request, which requires distinguishing between persons with similar names. The Information Exchange Workgroup viewed the creation and maintenance of a master person/patient index, and uniquely identifying the correct patient with high accuracy, as critical to ensuring a secure and uniform exchange. The Workgroup was

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[17] Wisconsin Department of Administration,
http://www.doa.state.wi.us/pagesubtext_detail.asp?linksubcatid=1030&linkcatid=308&linkid=, accessed 10/9/06.

made aware that both the Wisconsin Immunization Registry (WIR) and the CARES system are using algorithms to link their clients to the correct information. Also, increased investment in master person indexes across the state system could enable the state to develop a "source of truth" in uniquely identifying users and patients. As implementation activities begin, the Workgroup recommends these systems be assessed and leveraged to the extent possible to ensure the provider accesses the right information about the right patient, increasing confidence in the exchange and improving patient care.

The Workgroup also recommends further assessment of relevant existing private and public information technology and exchange initiatives to identify where they could increase the value of information exchange for both private and public sector health care delivery, as well as to determine where they can further the adoption of health information technology. For example, as electronic health record system deployment increases in the state, existing data collection services for systems such as the Public Health Information Network will increasingly transition toward emphasizing data aggregation and analysis. Development of health information technology and health information exchange resources should occur in tandem, where appropriate.

> **CHARGE 4:** Recommend a process inclusive of the appropriate groups and organizations to establish technology design guidelines including compliance with national standards.

The membership of the Workgroup is broad-based and includes the following representatives:

Members
- *Chair:* Hugh Zettel, Government and Industry Relations, GE Healthcare
- Christopher Alban, Epic Systems Corporation
- John Hartman, Visonex Corporation
- Scott Novogoratz, Advanced Healthcare
- Debra Rislow, Gundersen Lutheran
- Susan Turney, Wisconsin Medical Society
- Denise Webb, Medicaid Liaison, Division of Health Care Financing, DHFS
- Louis Wenzlow, Rural Wisconsin Health Cooperative

Resources
- Keith Haugrud, SAS Institute, Inc.
- Terry Hiltz, Public Health Information Network (PHIN) project manager, Division of Public Health, DHFS
- Laura Kreofsky, First Consulting Group
- Matt Miszewski, State Chief Information Officer
- Debbie Rickleman, Wisconsin Hospital Association
- Vinny Taneja, Northwoods Consortium Epidemiologist
- Herb Thompson, Bureau of Information Systems, DHFS
- Lorna Will, Surveillance Epidemiologist, Division of Public Health, DHFS

A joint stakeholder listening session was conducted for the Patient Care and Information Exchange Workgroups on November 9, 2006, in Wauwatosa, Wisconsin. Nearly 20 individuals

attended in person and 19 individuals joined the session live through the Department of Health and Family Service's (DHFS's) webcast service.

During the event, attendees were invited to share their thoughts and concerns regarding the proposed recommendations of both workgroups in terms of the technology structure and key first products. Recommendations from participants:

- "Just do it" – Many organizations are implementing electronic health information technology, and now is the time to start exchanging that information.
- "Act sooner, rather than later" –There must be a sense of urgency to this effort. It cannot be allowed to develop naturally, but needs to be promoted and guided to reach the expected results.
- The importance of a comprehensive record to include all patient encounters and all health care providers (e.g., dental).
- The barriers to HIE need to be identified and solutions developed, keeping in mind that as the barriers are resolved new ones may surface.
- Prioritization of the key products is necessary as there are a finite amount of resources to put towards this effort. For example, one suggestion was to focus on the exchange of information not the adoption of HIT as many are already moving down that path. People will follow when it makes sense.
- Education is a key to adoption, not only in how to use the system, but in promoting new workflows to integrate these systems into practices
- Capitalize on the existing health information exchanges, both public and private.
- Make sure that information can easily be shared electronically.

Wisconsin is well represented on the current national health care interoperability standards initiatives such as involvement of state-based HIT system developers, state IT leadership in the National Governors Association, security and privacy policy initiatives, Public Health Information Network leadership, and health care quality reporting initiatives. The Workgroup recommends the eHealth Board establish a multi-stakeholder panel to make recommendations to the Board regarding national health information exchange initiatives and their impact on the state's roadmap.

The Governance Workgroup recommends creation of an ongoing advisory committee on information exchange, which will be a way to assure broad stakeholder engagement in the future.

CHARGE 5: Recommend policies and practices to promote availability of health information across medical care settings that can be promoted short term before full deployment of interoperable, real-time data exchanges are feasible.

The Workgroup recommends Wisconsin explore the ability to provide access to clinical information based on existing claims data (including Medicaid, Medicare, and private insurers), which demonstrates cost reductions and quality improvements, especially in emergency department-related use cases. This allows the state to create access to information for a large segment of the population and acts as an important bridge as we move from paper-based records to electronic health record systems in physician practices, clinics, and hospitals.

Christiana Care Health Systems, in Newark, Delaware, has collaborated with MEDecision and Blue Cross Blue Shield Association to develop a Web-accessible summary of patient data that is extracted from claims data. This information is used to triage patients and to help guide a patient interview. An informal study shows this historical patient summary provided information that the medical staff did not normally have 40% of the time.[18] In another study conducted at Christiana with private insurance carriers, emergency department access to historical clinical information from patient claims data resulted in a savings of $604 per encounter, compared to patient encounters where this information was not available.[19] Based on the emergence of these types of systems, the Workgroup believes that exchange services using administrative data are something that could be implemented in the short-term.

Additionally, through discussions with the Patient Care Workgroup, a simple example of an exchange service (one that only requires the three blocks of foundational infrastructure) is result delivery (also called clinical messaging) that permits entities like laboratories to deliver results to clinicians via an exchange. This has been included in phase 1 of the delivery method as a short–term goal. More information about the phasing being proposed can be found in Section 2.4.

The Workgroup also recommends further study of existing consumer-facing applications that provide access to existing health care information compiled by the State to develop strategies to increase the use of these existing valuable resources by state residents and health care providers.

CHARGE 6: Create technical requirements based on business and clinical use cases required for the first key product types such as the use of data and messaging standards, business intelligence user authentication and an approach to a patient index.

As mentioned in section 2.4, the Workgroup discussed an incremental approach to achieving the exchange of health information. The Workgroup recommends this charge be reconsidered in the next phase of Wisconsin's eHealth Initiative with the phasing options identified in Charge 2 as a guideline, and assigning a multi-stakeholder group as outlined in Charge 4 to facilitate the process.

NEXT STEPS

The Information Exchange Workgroup recommends the following next steps:

- Finalize recommendations on architectural requirements.
- Identify a minimum set of standards to support recommendations and an initial set of business opportunities for the advancement of HIT.
- Continue to monitor and coordinate activities with the Nationwide Health Information Network pilot program, related HITSP interoperability, and other national efforts that may influence ongoing HIE technology planning and implementation.

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[18] M.L. Baker; Insurers, Internet Fill Emergency Room Info Gaps, May 16, 2006; http://www.eweek.com/article2/0,1895,1963284,00.asp; accessed November 2, 2006.
[19] V.J. Willey, G.W. Daniel, An Economic Evaluation of Use of a Payer-Based Electronic Health Record within an Emergency Department, July 24, 2006.

- Continue to identify and promote use of appropriate existing state information technology assets to increase the value of information exchange for both private and public sector health care delivery.
- Continue discussion of the role of the patient in accessing his/her own health information.
- Determine how e-prescribing promotion can help accelerate broader HIT adoption in the ambulatory care setting.
- Prioritize the use cases developed by the Patient Care Workgroup that would have the most impact and create technical requirements for their implementation.
- Establish criteria for a qualitative analysis of HIT density indicators, such as levels of system adoption.
- Expand the HIT Density Study to include:
    a. Indicators to include additional HIT systems.
    b. Non-Rural Wisconsin Health Cooperative (RWHC) Critical Access Hospitals (CAHs) in Wisconsin, which may shed light on the impact of collaboratives on HIT adoption.
    c. All Wisconsin hospitals, in order to shed light on the difference between rural and urban hospital HIT adoption levels.
    d. Out-of-state hospitals, in order to determine whether the Wisconsin experience is characteristic or anomalous.
- Expand the HIT Density Study to determine the status of HIT linkages between rural hospitals and public health immunization registries and other population health initiatives.

Attachments

Attachment 1: Glossary of Terms

Glossary of Selected Terms Related to e-Health[20]

ASTM – ASTM International is a not-for-profit standards developing organization with an interest in extending comprehensive standards in the health care community, including specification for the Continuity of Care (CCR) Record.

American Health Information Community (AHIC) – The Community was formed on September 13, 2005, by Health and Human Services (HHS) Secretary Michael O. Leavitt to help advance efforts to reach President Bush's call for most Americans to have electronic health records within ten years. The Community has formed six workgroups: Biosurveillance; Chronic Care; Confidentiality, Privacy, and Security; Consumer Empowerment; Electronic Health Records; and Quality.

Agency for Healthcare Research and Quality (AHRQ) – The lead Federal agency charged with improving the quality, safety, efficiency, and effectiveness of health care for all Americans. As one of 12 agencies within the Department of Health and Human Services, AHRQ supports health services research that will improve the quality of health care and promote evidence-based decision making.

BadgerNet Converged Network (BCN) – A Wisconsin project to provide dynamic, scalable bandwidth on a vendor-managed network to primarily public entities across the state.[21]

Blue Cross/Blue Shield (BC/BS) – The insurance corporation that when converted to a private shareholder corporation, directed its public assets to a public health endowment fund. The fund is split between Wisconsin's two medical schools, which distribute partnership grants in support of the fund's mission.

Centers for Medicare and Medicaid Services (CMS) – The federal agency that runs the Medicare program, and works with the States to run the Medicaid program to ensure that the beneficiaries receive high quality health care. CMS is responsible for oversight of HIPAA administrative simplification transaction and code sets, health identifiers, and security standards.

Certification Commission for Health Information Technology (CCHIT) – A voluntary, private-sector organization to certify HIT products, initially focusing on ambulatory EHRs for the office-based physician or provider, inpatient EHRs for hospitals and health systems, and the network components through which they interoperate and share information. The American Health Information Management Association (AHIMA), the Healthcare Information and Management Systems Society (HIMSS) and The National Alliance for Health Information

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[20] Source: Based on the Minnesota Department of Health, *Minnesota's Glossary of Selected Terms Related to e-Health*, http://www.health.state.mn.us/e-health/glossary.html, accessed November 6, 2006.

[21] Department of Administration, BadgerCare Converged Network, http://www.doa.state.wi.us/pagesubtext_detail.asp?linksubcatid=1030andlinkcatid=308andlinkid=, accessed November 21, 2006.

Technology (Alliance), three leading HIT industry associations, joined forces and committed resources during its organization phase.

Client Assistance for Re-employment and Economic Support (CARES) – The Wisconsin eligibility determination system used for Medicaid, FoodShare, Wisconsin Works, and Child Care.

Computerized Provider Order Entry (CPOE) – A computer application that allows a physician's orders for diagnostic and treatment services (such as medications, laboratory, and other tests) to be entered electronically instead of being recorded on order sheets or prescription pads. The computer compares the order against standards for dosing, checks for allergies or interactions with other medications, and warns the physician about potential problems.

Consolidated Health Informatics (CHI) Initiative – One of the 24 Presidential eGovernment initiatives with the goal of adopting vocabulary and messaging standards to facilitate communication of clinical information across the federal health enterprise.

Continuity of Care Record (CCR) – A core data set of the most relevant administrative, demographic, and clinical information about a patient's health care, covering one or more health care encounters. It provides a means for one health care practitioner, system, or setting to aggregate all of the pertinent data about a patient and forward it to another practitioner, system, or setting to support the continuity of care.

Decision-Support System (DSS) – Computer tools or applications to assist physicians in clinical decisions by providing evidence-based knowledge in the context of patient-specific data. Examples include drug interaction alerts at the time medication is prescribed and reminders for specific guideline-based interventions during the care of patients with chronic disease. Information should be presented in a patient-centric view of individual care and also in a population or aggregate view to support population health management and quality improvement.

DICOM – Digital Imaging and Communications in Medicine, a standard in the field of medical informatics for exchanging digital information between medical imaging equipment (such as radiological imaging) and other systems, ensuring interoperability. The standard specifies: a set of protocols for devices communicating over a network; the syntax and semantics of commands and associated information that can be exchanged using these protocols; and a set of media storage services and devices claiming conformance to the standard, as well as a file format and a medical directory structure to facilitate access to the images and related information stored on media that share information.[22]

Edge Server – A server located at a point near the end users.

Electronic Health Record (EHR) – A real-time patient health record with access to evidence-based decision support tools that can be used to aid clinicians in decision-making. The EHR can automate and streamline a clinician's workflow, ensuring that all clinical information is

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[22] Definition obtained from http://www.webopedia.com/TERM/D/DICOM.html, accessed November 6, 2006.

communicated. It can also prevent delays in response that result in gaps in care. The EHR can also support the collection of data for uses other than clinical care, such as billing, quality management, outcome reporting, and public health disease surveillance and reporting.

Electronic Medical Record (EMR) – See Electronic Health Record (EHR).

Electronic Prescribing (eRx) – A type of computer technology whereby physicians use handheld or personal computer devices to review drug and formulary coverage and to transmit prescriptions to a printer or to a local pharmacy. E-prescribing software can be integrated into existing clinical information systems to allow physician access to patient-specific information to screen for drug interactions and allergies.

Enterprise Architecture – A strategic resource that aligns business and technology, leverages shared assets, builds internal and external partnerships, and optimizes the value of information technology services.

Federal Health Architecture (FHA) – A collaborative body composed of several federal departments and agencies, including the Department of Health and Human Services (HHS), the Department of Homeland Security (DHS), the Department of Veterans Affairs (VA), the Environmental Protection Agency (EPA), the United States Department of Agriculture (USDA), the Department of Defense (DoD), and the Department of Energy (DOE). FHA provides a framework for linking health business processes to technology solutions and standards, and for demonstrating how these solutions achieve improved health performance outcomes.

Federated HIE Model – A model where health information is stored where care is provided, and accessed remotely as needed.

Health Information Exchange (HIE) – The electronic mobilization of health care information across organizations through shared infrastructure between organizations. Shared community-level information services are built once for many users. Examples include results delivert, historical patient information such as a prescribed medication list, and other products, which are supported by regional implementation of technologies. These technologies may include a secure Web portal, health care terminology translation tools, a master patient index (MPI), authentication and authorization infrastructure, and products that aggregate information from multiple sources.

Health Information Technology (HIT) – The application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of health care information, data, and knowledge for communication and decision making. Examples of HIT include electronic health record systems, laboratory information systems, administrative and billing systems, and workflow systems.

Health Information Management Systems Society (HIMSS) – A health care industry member organization focused on providing global leadership in the use of HIT and management systems in providing high quality patient care.

Healthcare Information Technology Standards Panel (HITSP) – A multi-stakeholder coordinating body designed to provide the process within which stakeholders identify, select, and harmonize standards for communicating and encouraging broad deployment and exchange of health care information throughout the health care spectrum. The Panel's processes are business process and use-case driven, with decision making based on the needs of all NHIN stakeholders. The Panel's activities are led by the American National Standards Institute (ANSI), a not-for-profit organization that has been coordinating the U.S. voluntary standardization system since 1918.

Health Information Security and Privacy Collaborative (HISPC) – Funded by AHRQ through Research Triangle Insternational and the National Governors Association, the Health Information Security and Privacy Collaboration has subcontracted with 33 states and 1 territory to create HISPC. HISPC subcontractors will involve state leadership and a broad range of stakeholders in health information exchange to assess the variations that exist at the organization level with respect to privacy and security practices and policies - and the legal bases for such practices and polices, where applicable.

HIPAA Collaborative of Wisconsin (COW) – A non-profit organization open to entities considered to be Covered Entities, Business Associates, and/or Trading Partners under HIPAA, as well as any other organization affected by HIPAA regulation.

HL7 – An acronym for Health Level 7, the international standards-setting organization, that develops standards for health care and is the interface standard for communication between various systems employed in the medical community. HL7 has adopted a standard for Clinical Document Architecture (CDA), a standard for the functionality of an Electronic Health Record System (EHR) and a standard Reference Information Model (RIM).

Hybrid HIE Model – A model in which some data is centralized and other information is stored at locations where care is provided. Data providers have a choice of maintaining constant access to their own data servers or allowing their data to be stored in a central location for retrieval.

Master Patient/Person Index (MPI) – A way to uniquely identify a patient in relation to his or her medical records.

Medicaid (Medicaid) – A joint federal/state program established in 1965 under Title XIX of the Social Security Act to pay for medical services for people with disabilities, people 65 years and older, children and their caretakers, and pregnant women who meet the program's financial requirements. This program is administered in Wisconsin by the Department of Health and Family Services (DHFS). In State Fiscal Year 2005, budgeted expenditures (both state and federal) for Wisconsin Medicaid totaled $4.5 billion. Enrollment totaled 827,000 people, or 15% of Wisconsin's population.

Medical Group Management Association (MGMA) – The mission of MGMA is to continually improve the performance of medical group practice professionals and the organizations they represent.

Medical Trading Area (MTA) – The natural market within which most referrals, hospitalizations, and other flows of both patients and patient information typically occur. Another term for this is a medical referral area.

Nationwide Health Information Network (NHIN) – A national effort to establish a network to improve the quality and safety of care, reduce errors, increase the speed and accuracy of treatment, improve efficiency, and reduce health care costs.

OASIS – OASIS (Organization for the Advancement of Structured Information Standards) is a nonprofit, international consortium whose goal is to promote the adoption of product-independent standards for information formats such as Standard Generalized Markup Language (SGML), Extensible Markup Language (XML), and Hypertext Markup Language (HTML). Currently, OASIS (formerly known as SGML Open) is working to bring together competitors and industry standards groups with conflicting perspectives to discuss using XML as a common Web language that can be shared across applications and platforms.

Office of the National Coordinator (ONC) – The National Coordinator for Health Information Technology serves as the U.S. Department of Health and Human Services (HHS) Secretary's principal advisor on the development, application, and use of health information technology; coordinates the HHS health information technology programs; ensures that HHS health information technology policy and programs are coordinated with those of other relevant executive branch agencies; and to the extent permitted by law, develops, maintains, and directs the implementation of a strategic plan to guide the nationwide implementation of interoperable health information technology in both the public and private health care sectors that will reduce medical errors, improve quality, and produce greater value for health care expenditures.

Pay for Quality (P4Q)/Pay for Performance (P4P) –A method of providing incentives, both financial and recognition, for quality outcomes in health care, rather than paying simply for services.

Public Health Information Network (PHIN) – A national initiative led by the Centers for Disease Control and Prevention (CDC) to implement a single information network that will integrate, functionally and organizationally, public health partners across the nation. PHIN establishes technical and data standards and work specifications, and provides a process for developing and implementing specifications and standards.

Regional Health Information Network (RHIN) – The health information exchange system operated by the RHIO.

Regional Health Information Organization (RHIO) – An independent corporation that is intended to operate an exchange of clinical health information among competing stakeholder organizations supporting multiple use cases. A RHIO is the organization through which most HIE services are selected, developed, and delivered (although technical implementation might be performed by contracted third parties).

Return on Investment (ROI) – The actual or perceived future value of an expense or investment. This can be in terms of dollars saved or in productivity.

Rural Wisconsin Health Cooperative (RWHC) – A Wisconsin organization that is owned and operated by 29 rural acute, general medical-surgical hospitals. The Agency for Healthcare Research and Quality awarded a planning grant to the organization in October 2004 to begin work on behalf of a collaborative of 19 health care organizations, both rural and urban, to improve the quality of care and efficiency of service delivery by leveraging health information technology.

Thin Network or Client – A simple client program or device designed to be especially small so that the bulk of the data processing occurs on the server.

Wisconsin Collaborative for Healthcare Quality (WCHQ) – A voluntary consortium of organizations learning and working together to improve the quality and cost effectiveness of health care for the people of Wisconsin. Members are a group of multi-specialty physician groups, hospitals, health plans, employers and labor organizations from geographically diverse areas of the state. The collaborative was founded in 2003 on the principle that by focusing on improving quality, better care and more rational costs will result.

Wisconsin Department of Health and Family Services (DHFS) – The Wisconsin agency responsible for child welfare, long-term care, physical and developmental disability programs, sensory disability programs, substance abuse, mental health and public health programs, regulation and licensing of a variety of facilities, operation of care and treatment facilities, the food stamp program, medical assistance and health care for low income families, elderly and disabled persons.

Wisconsin Department of Employee Trust Funds (ETF) – The Wisconsin agency for administering retirement and other benefit programs for participants and employers in the Wisconsin Retirement System (WRS), covering state and local government employees and retirees.

Wisconsin Health Information Exchange (WHIE) – A RHIO in Southeast Wisconsin that is a membership organization of health care entities to create, govern and continuously improve regional exchange of health information. The mission of WHIE is to provide a system where diverse stakeholders collaborate to enable secure, confidential exchange of health information between authorized users, with a vision of a world where health professionals and patients access information securely, when and where needed, to improve the safety, quality and efficiency of health care and public health.

Wisconsin Health Information Management Association (WHMA) – A not-for-profit organization that develops products and provides services regarding guidelines for confidentiality of patient information, advance workforce excellence and foster best practices in health information management.

Wisconsin Health Information Organization (WHIO) – A Wisconsin membership organization established in August 2005 to create the state's largest warehouse of information on the cost and outcome of health care provided by hospitals and doctors. Health information from the member organizations will be aggregated, analyzed and reported across episodes of care to help members improve their services and to support purchasing for value.

Wisconsin Immunization Registry (WIR) – A computerized Internet database application developed to record and track immunization dates of Wisconsin's children and adults.

Wisconsin Public Health Information Network (WPHIN) – A network under development by the Wisconsin Department of Health and Family Services that will provide statewide and community-level population data needed for community health status assessment, policy development, assurance, service delivery, resources management and accountability.

Density of HIT Adoption
In RWHC Member Hospitals

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Table of Contents

1. Introduction

The primary goal of this study is to determine the levels of health information technology (HIT) system adoption in RWHC member hospitals. Supplementary goals include:

1. To determine the types of clinical data that exist in electronic form in participant hospitals.
2. To determine to what extent rural/community hospitals have implemented EHRs and patient safety systems.
3. To draw conclusions from the results for public policy related to statewide data exchange efforts.

Whereas EHRs in physician clinics tend to be comprised of a single or small number of systems, EHRs in the hospital environment tend to be comprised of dozens of systems, each of which contributes to the patient's electronic health record. In order to understand a hospital's level of EHR adoption, it is important to determine which of these systems the hospital has implemented.

This study is a quantitative analysis of whether or not participants have implemented any of 16 key HIT systems. The data for this study was collected through phone interviews with hospital information technology personnel.

2. HIT Density Study Participants

All 30 Rural Wisconsin Health Cooperative member hospitals, listed below, participated in this study. RWHC members include 25 critical access hospitals (which represent 45% of Wisconsin CAHs), and 5 hospitals with between 30 and 100 beds. RWHC member hospitals make up 22% of all Wisconsin hospitals.

RWHC Member Hospitals
Berlin Memorial Hospital (Berlin)
Black River Memorial Hospital (Black River Falls)
Boscobel Area Health Care (Boscobel)
Columbus Community Hospital (Columbus)
Divine Savior Healthcare (Portage)
Door County Memorial Hospital (Sturgeon Bay)
Edgerton Hospital and Health Services (Edgerton)
Grant Regional Health Center (Lancaster)
Langlade Memorial Hospital (Antigo)
Memorial Health Center (Medford)
Memorial Hospital of Lafayette County (Darlington)
Memorial Medical Center (Neillsville)
Mile Bluff Medical Center (Mauston)
The Monroe Clinic (Monroe)
Moundview Memorial Hospital and Clinics (Friendship)
Our Lady of Victory Hospital (Stanley)
Prairie du Chien Memorial Hospital (Prairie du Chien)
Reedsburg Area Medical Center (Reedsburg)
The Richland Hospital (Richland Center)
Ripon Medical Center (Ripon)
Sauk Prairie Memorial Hospital and Clinics (Prairie du Sac)

Shawano Medical Center (Shawano)
Southwest Health Center (Platteville)
St Clare Hospital and Health Services (Baraboo)
St Joseph's Community Health Services (Hillsboro)
Stoughton Hospital (Stoughton)
Tomah Memorial Hospital (Tomah)
Tri-County Memorial Hospital (Whitehall)
Upland Hills Health (Dodgeville)
Vernon Memorial Healthcare (Viroqua)

3. HIT Density Indicators

The following sixteen indicators were chosen as indicative of HIT density. This is not a comprehensive list of hospital EHR type systems, but covers many of the key systems associated with the concept "EHR." In those cases where there is significant ambiguity as to what constitutes a given system, the system was defined as indicated below. The definitions aren't meant to be authoritative, but were developed to ensure the consistency of the responses.

1. **Core MPI/Database/ADT** (Admit, Discharge, Transfer)
2. **Lab Information System**
3. **Pharmacy System**
4. **E-MAR** (real-time enterprise MAR)
   - A common electronic medication administration record that is used and updated in real-time by both pharmacists and providers.
5. **Medication Dispensing**
   - Computerized medication dispensing systems such as Pyxis, Omnicell, and Accudose.
6. **Radiology Information System** (RIS)
7. **Computerized Radiography** (Digital X-ray)
8. **PACS**
   - Picture Archive Communication System. A storage and management system for digital images that largely replaces or has the capacity to replace the Radiology department's film-based operations.
   - Hospitals are designated as PACS facilities if they (1) own their own PACS system, or (2) lease PACS space from another provider.
9. **Order Entry/Resulting**
   - The automation of the ordering, resulting, and billing process within departments such as Lab, Radiology, Pharmacy, and others.
10. **Inpatient Charting**
    - Inpatient nursing documentation is inputted electronically and available online
11. **Bedside Medication Verification**
    - Barcoding medications in unit dose, and then using a barcode reader at the bedside to verify that the right patient is getting the right medication at the right time.
12. **CPOE** (Computerized Provider Order Entry)
    - There is some controversy as to how and whether CPOE is distinguished from traditional order entry systems. For our purposes, CPOE is defined as an order entry system that is designed specifically for physicians, and that has decision

support tools, such as the ability to detect allergy, lab result, and duplicate medication contraindications.

13. EHR Portal
- A single user interface that provides an aggregate view of the facility's clinical information, including medical record transcriptions, lab results, med lists, etc.

14. Bulk Scanning of clinical information, such as medical records, handwritten notes, telemetry readings, etc.
- Many facilities may have scanning solutions for insurance cards and other facility management functions, but the facility only meets this criterion if the system is capable and intended to be used for the bulk scanning of medical records.

15. Surgery Management System
- The computerization of pick lists and preference cards, usually with a scheduling component.

16. Interface Engine/Expertise
- Most small hospitals rely on their core vendors to create point to point interfaces with other systems, but some have invested in interface engines to control the movement of the data themselves.

4. HIT Density Study Results

The results of the study are represented below in the form of bar graphs, along with commentary relating to each bar graph representation. The systems are considered adopted if they have been implemented or if they have been purchased and are scheduled for implementation in 2006. The hospitals have been de-identified, in order to avoid competitive advantage issues.

**Figure 1: Density of HIT Adoption in RWHC Member Hospitals (Aggregate View)**
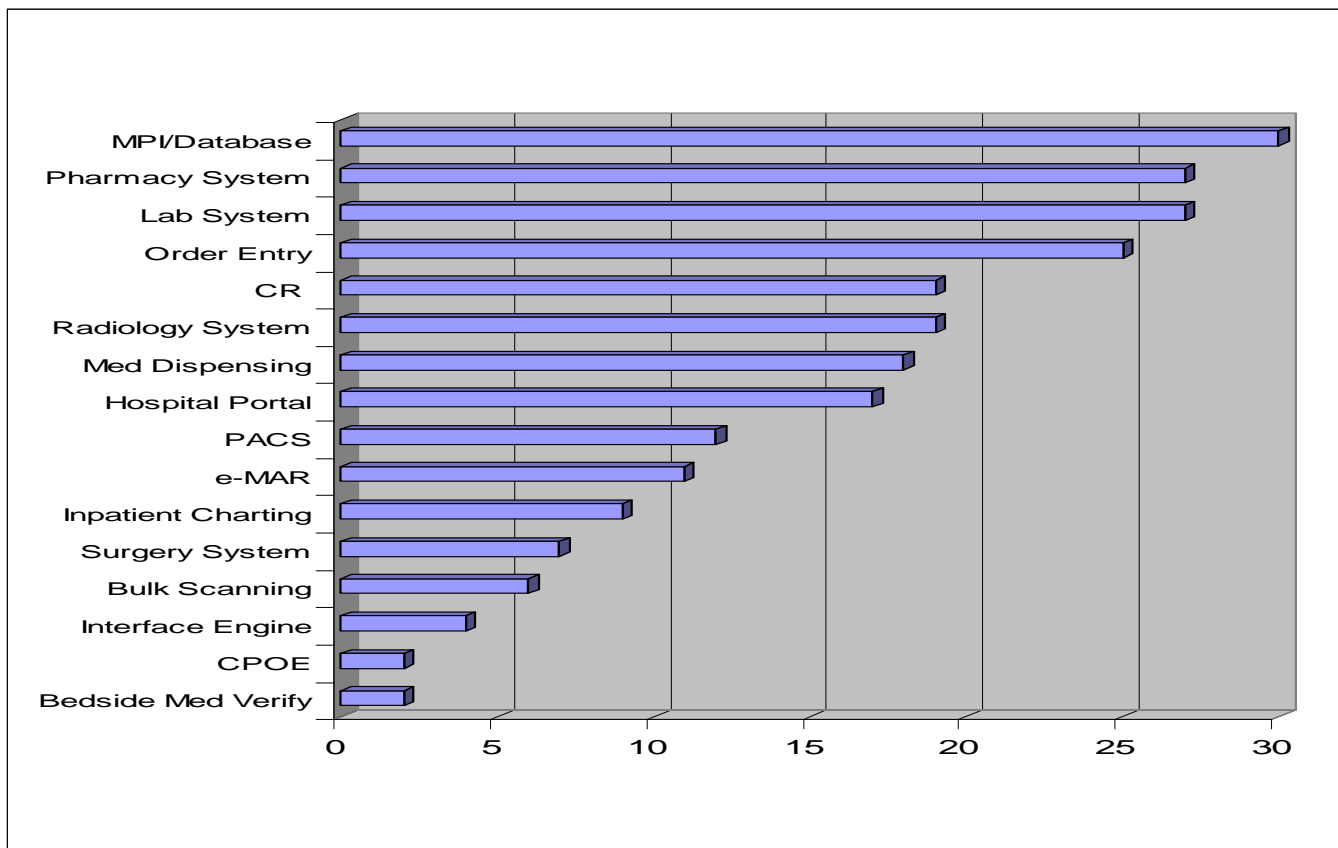
Commentary relating to Figure 1

- No real surprise that every hospital has a core MPI/Database
- The deep penetration of pharmacy, lab, and order entry systems, with over 80% of respondents reporting their adoption, is a positive sign.
- A majority of hospitals have CR, RIS, medication dispensing, and some sort of aggregate view of clinical data available to providers.
- PACS adoption is higher than expected, with 8 hospitals having their own PACS systems, and 4 others storing their digital images in a PACS system.
- Regarding e-MAR, inpatient charting, and surgery, it makes sense that we see a significant drop off here, as these clinical systems are costlier, require advanced change management and educational resources, and require significant ongoing investment to operate.
- There's a low number of hospitals with interface engines, and it's important to point out here that hospitals with interface engines do not necessarily have a large number of clinical systems implemented, as we'll see in Figure 4.
- The low adoption of CPOE and med verification is likely due to the expense and provider change management challenges associated with these systems. Those facilities that have built to these patient safety systems have followed integrated models and put the other pieces in place first, as we'll see in figure 4.

Figure 2: HIT Adoption by Facility
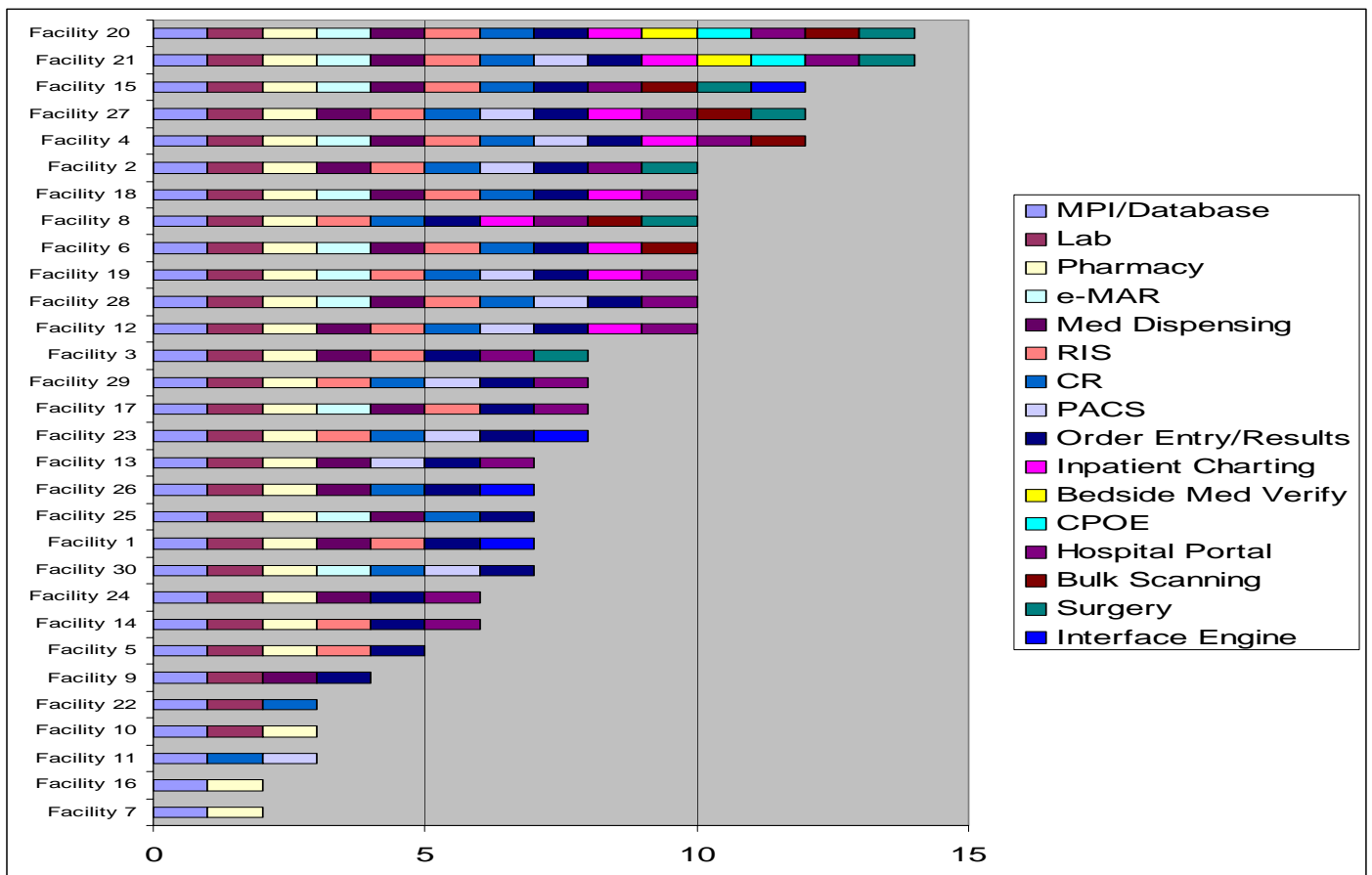
Commentary relating to Figure 2
- Hospitals have anywhere between 2 and 14 of the 16 indicators.
- Over half the hospitals have at least 8 of the 16 indicators
- Those with advanced patient safety systems (CPOE and medication verification) use integrated systems (see figures 3 and 4) and have implemented the other parts of their EHR environment first.

Figure 3: Hospital Information System (HIS) Architecture
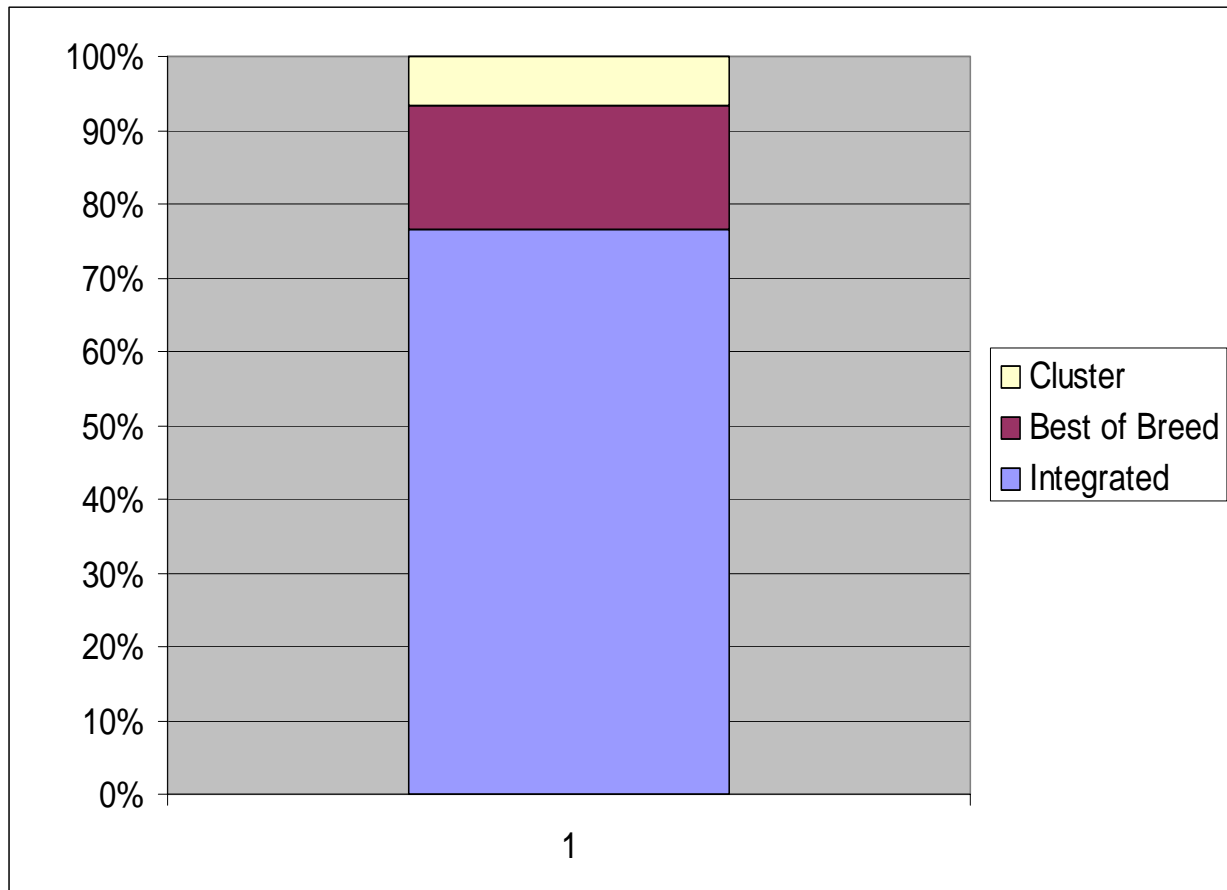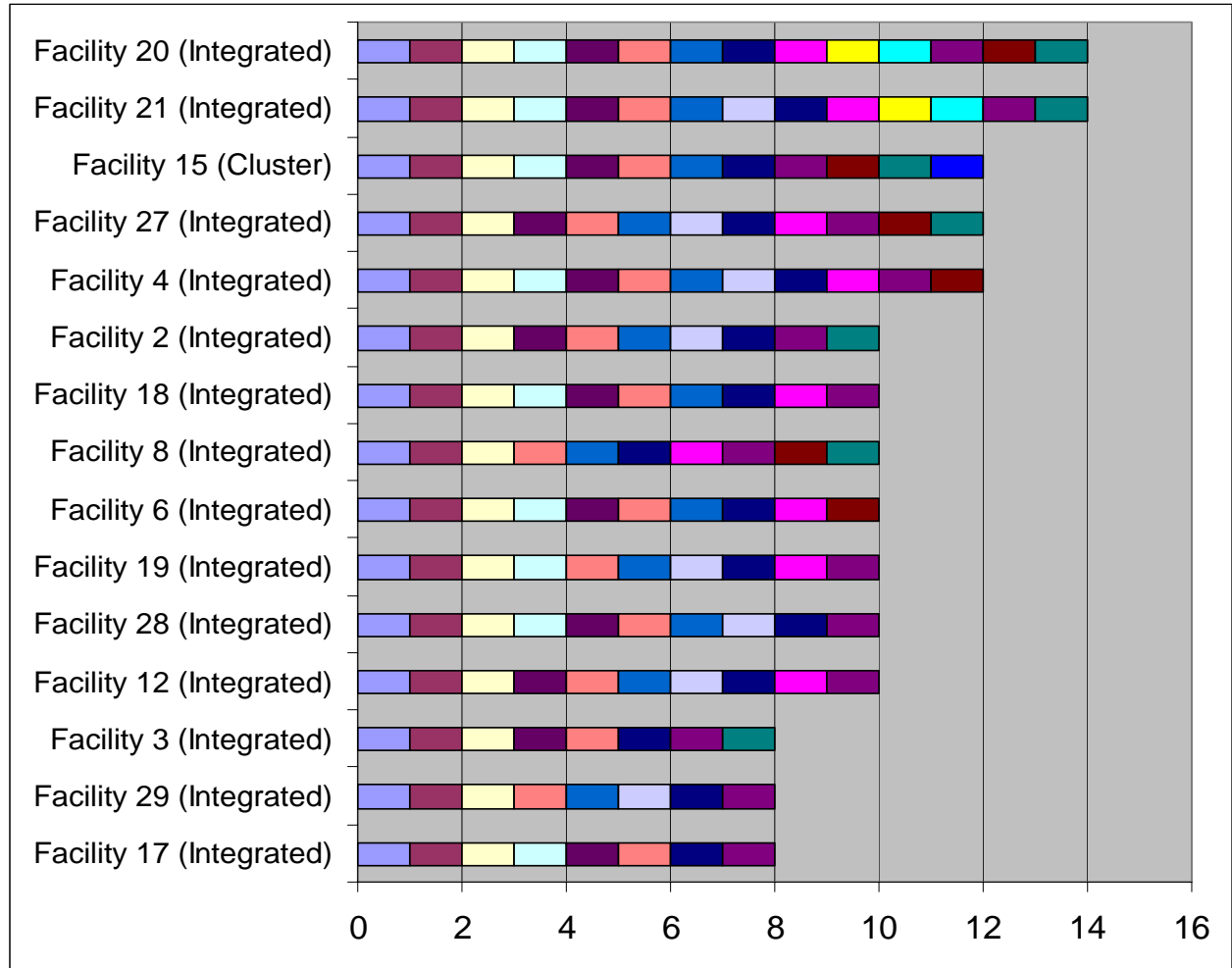

Commentary relating to Figure 3
This slide breaks out hospital system implementation strategies by HIS architecture, with nearly 80% of hospitals using an integrated strategy.

Integrated is defined as the strategy of using primarily one vendor for HIS needs.

Cluster is defined as the strategy of using a limited cluster of vendors for HIS needs, as when one vendor is used for clinical functions and another for financial and facility management functions.

Best of breed is defined as the strategy of using many disparate vendors in a variety of areas/departments. (In the small hospital context, best of breed often means least of breed, as low cost stand alone systems are common in the HIT marketplace.)

Figure 4: HIT Density Related to Architecture

Commentary related to figure 4

- Significantly, 14 of the top 15 HIT adopting hospitals use an integrated strategy for HIS implementation
- Only one hospital (the cluster hospital) in this group has an interface engine. Not captured in this slide is the fact that this hospital has a significantly larger number of staff devoted to supporting their environment than the integrated hospitals.
- The two hospitals that have implemented advanced patient safety systems (CPOE and medication verification) use an integrated strategy and have implemented the other parts of their EHR environment first.
- The 6 other cluster and best of breed hospitals are in the bottom half of clinical system implementers.

Figure 5: HIT Density Related to Volume (represented by Net Patient Revenue)
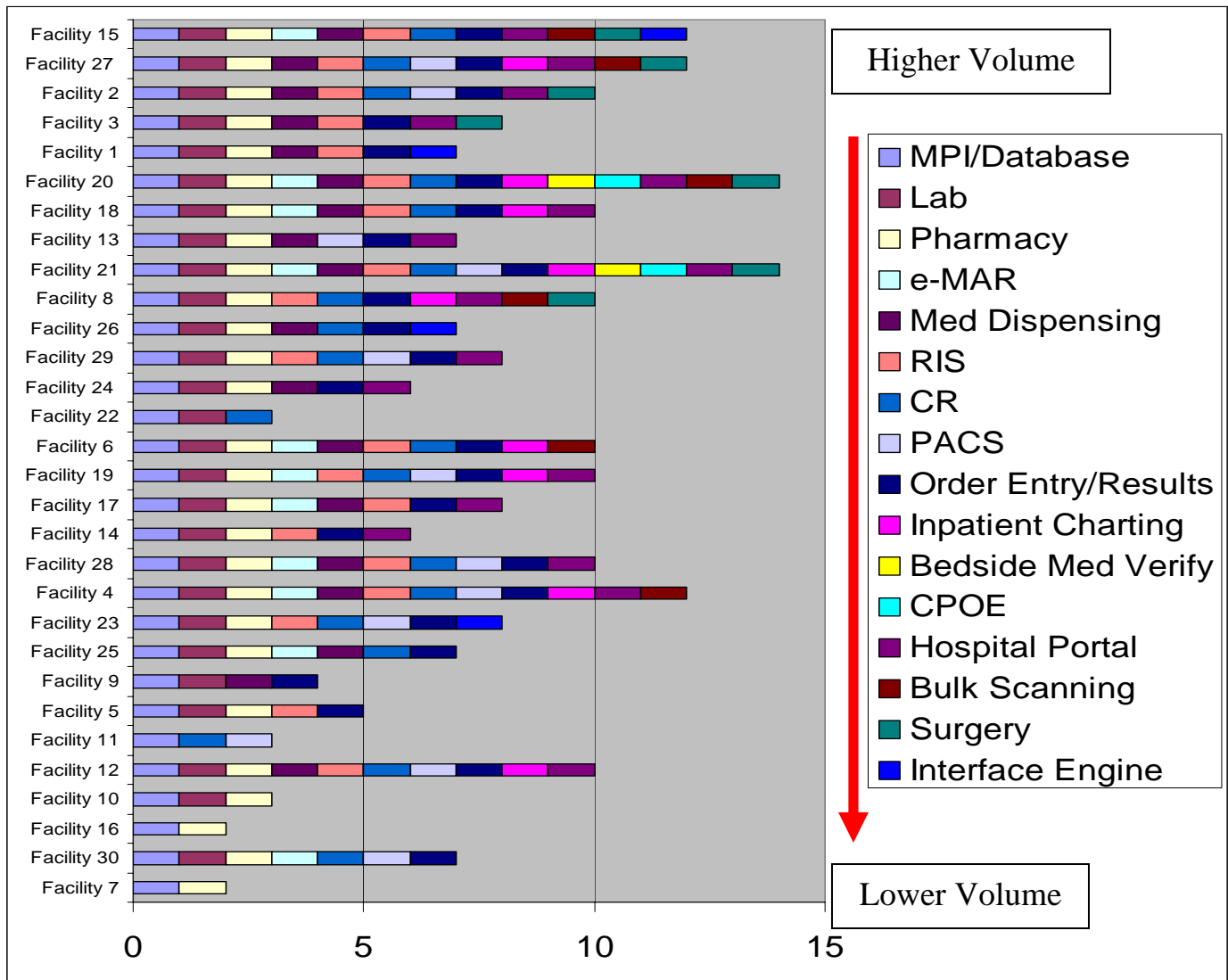
Commentary related to figure 5

- One would expect a higher adoption of HIT in higher volume hospitals, as higher volume may correlated with (1) more capital, (2) more IT staff, (3) and greater HIT financial return on investment, to the extend that HIT financial ROI depends on volume, which it often does.
- Interestingly, we don't see a clear trend in this regard among the top two thirds of these facilities. It's only when we look at very lowest volume facilities that we see a dramatic drop-off in clinical system use.
- It's important to note that even the lowest volume facilities (such as facilities 30 and 12) are capable of making significant strides.

Figure 6: HIT Density Related to Affiliation with Larger Organization
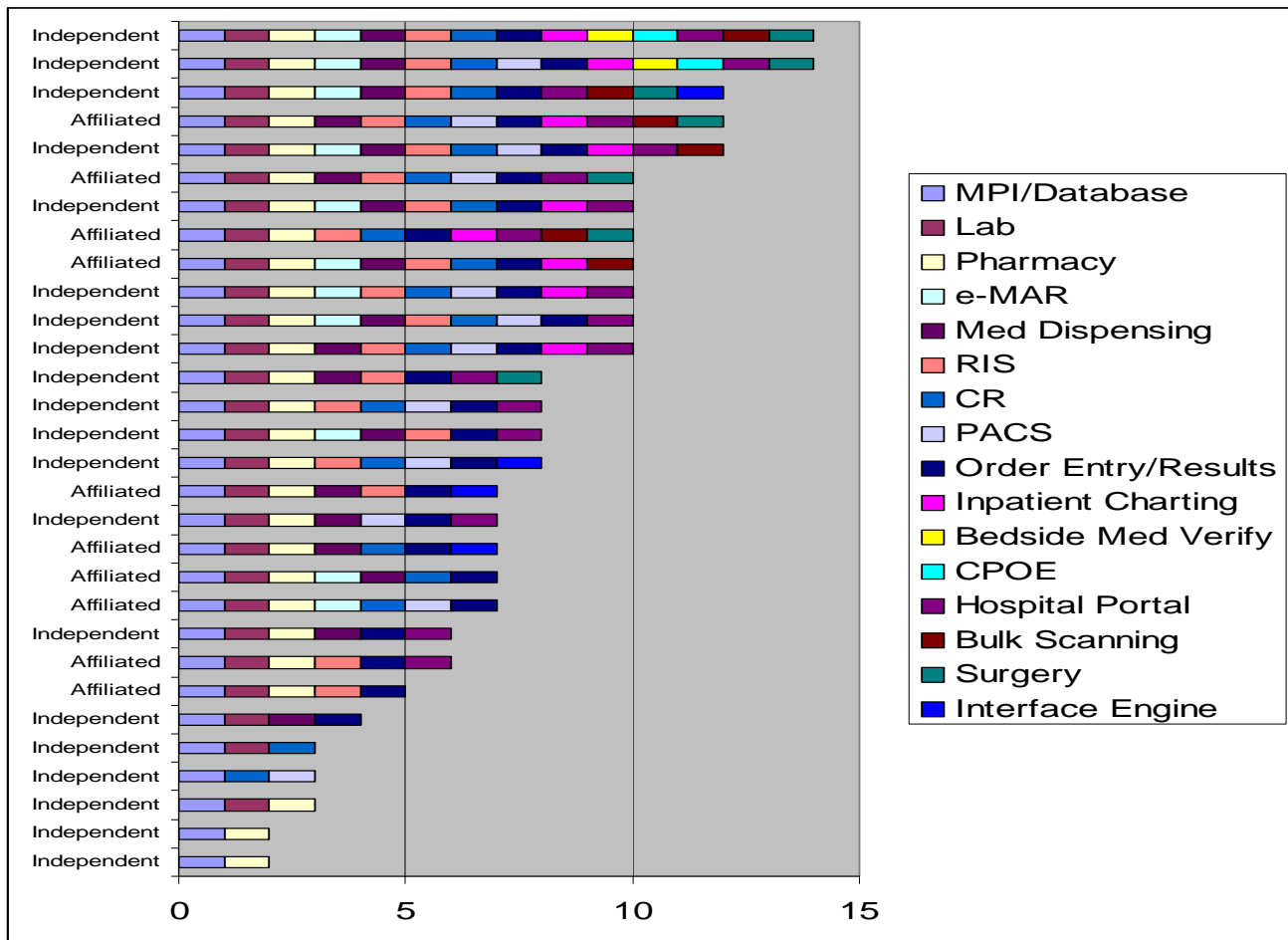
Commentary related to figure 6

10 of the 30 RWHC member hospitals are either owned or in some way affiliated with larger organizations, so that they may (now or in the future) get assistance with their EHR building process from these larger organizations. This slide identifies affiliated hospitals and their levels of HIT adoption.

- HIT adoption is clearly not dependent on affiliation with larger organizations, as 4 of the 5 top adopters are independent hospitals.
- Affiliated hospitals may or may not have significant HIT adoption. It would be interesting to determine whether this correlates with the HIT adoption rates of their affiliate organizations.
- The lowest six HIT adopters are independent organizations. Given their low levels of adoption these organizations may need assistance with their EHR implementation process, possibly through collaborative implementations, which several of these hospitals are currently in the process of planning.

5. Conclusions

A variety of conclusions have already been drawn in the commentary. In summary, key takeaways include the following:

9. *There is significant density of HIT adoption in RWHC member hospitals, perhaps more than expected, given their size.*

10. *HIT adoption is increasing, as many study participants noted plans for 2007 implementations that are not reflected in this report.*

11. *The integrated single vendor model seems to be especially successful for smaller hospitals.*

12. *There is low interfacing engine adoption even in high HIT density facilities (without exception, integrated model facilities do not own interface engines).*

13. *Avoiding the complexities of interfacing by using an integrated strategy may be a key way that smaller hospitals succeed in expanding their HIT adoption to advanced patient safety systems.*

14. *The service volume of an organization is not necessarily predictive of HIT adoption until you look at the lowest volume facilities.*

15. *Affiliation with a larger organization is not predictive of HIT adoption, though organizations with the fewest HIT systems implemented tend to be independent.*

16. *Low volume—particularly low volume unaffiliated—organizations may need help implementing EHR systems.*

6. Recommendations for Public Policy, especially in relation to statewide information exchange efforts

These results and conclusions have a variety of implication for public policy makers as they plan for a health information exchange environment in Wisconsin. <u>Preliminary</u> recommendations by the Rural Wisconsin Health Cooperative include the following:

1. *Beware EHR-lite.*

Some states have advocated partial EHR systems for small facilities as a way to get some data rather than no data. EHR-lite systems have been defined in a number of ways. If EHR-lite systems are defined as partial EHR systems that do not have a clear migration path to advanced patient safety systems and tools, then policy makers

should beware advocating these, as a position in favor of this type of EHR-lite may slow down what our data shows is a movement toward **real** EHR adoption.

(Note: EHR-lite has sometimes been confused with EHR ASP models, which are remotely hosted EHRs. There are many robust ASP implementations throughout the country—INHS, SISU, etc. We support ASP models to the extent that they provide a clear migration path to advanced patient safety systems.)

2. ***Don't make small hospitals choose between investing in internal patient safety HIT and information exchange.***

According to the Santa Barbara Data Exchange Moving Toward Electronic Health Information Exchange: Interim Report (2003) "The analysis shows that there are positive returns to health information exchange in all except small communities (e.g., one hospital and less than 100 physicians)…" And according to the Advisory Board NIHIT Briefing (2005), "hospitals and providers foot 97% of the ongoing costs (of information exchange), yet receive just 56% of the potential benefits. The remaining benefits are dispersed among payers and other stakeholders."

Given the above reality, and the additional reality that even internal HIT system implementation doesn't always have a financial ROI for small volume facilities, it is important to make sure costs associated with information exchange do not place an undue burden on smaller hospitals and thereby slow down the implementation of clinical and patient safety systems.

The implementation of robust EHRs and associated patient safety systems by small hospitals will do more to protect Wisconsin residents living in rural communities than information exchange without these systems.

3. ***Smaller hospitals will need help interfacing to (and from) the information exchange environment that emerges.***

Even small hospitals that are advanced in their EHR adoption generally do not have interface engines or interface expertise, and often have limited IT resources inhouse. Given this reality, it is important that interfacing hardware, software, and expertise resources be provided to smaller facilities to the extent that these are required for full participation in information exchange.

As we look forward to a Wisconsin information exchange environment, we must consider that an early phase of this environment could force providers to login to at least 2 information sources (their local EHR, and the RHIO or statewide system). Larger hospitals with interface expertise will address this issue by creating interfaces to bring the exchange information back into their local EHR systems as soon as data standards allow. There is a danger that small hospitals without interface expertise will be left behind in this dysfunctional multiple login environment unless there are plans and resources to assist them.

4. ***Develop ways to help low volume facilities implement EHRs (through matching grants, loans, collaborative arrangements, etc.)***

Lowest volume facilities have the hardest time implementing EHRs, due to the fact that the cost of building and maintaining EHRs can be prohibitive for these facilities, and a financial ROI from their EHR implementations may not exist, given their low volumes. Public policy makers should find ways to support our smallest healthcare facilities in their efforts to implement EHRs; and to support multi-organizational EHR building collaborative efforts that have been shown to be successful in other regions and states.

A number of Rural Wisconsin Health Cooperative member hospitals, including most of the small volume hospitals identified earlier, are currently engaged in planning for such a collaborative effort.

5. ***Do not compete on the exchange of information: Value must accrue to all participants.***

Many small hospitals have referral relationships with multiple referral centers. The information exchange that emerges in Wisconsin **MUST** allow for the flexible flow of clinical data so that small hospitals aren't forced into predetermined data exchange relationships that primarily benefit large hospitals and their rural outreach programs. **Wisconsin HIT needs public highways, not private, limited access toll roads.**

7. Recommendations for Further Research

- Expand the HIT Density indicators to include additional HIT systems.
- Establish criteria for a qualitative analysis of the HIT density indicators, such as levels of system adoption.
- Expand the study to determine status of HIT linkages between rural hospitals and public health immunization registers and other population health initiatives.
- Expand the study to include non-RWHC CAHs in the state of Wisconsin, which may shed light on the impact of collaboratives on HIT adoption.
- Expand the study to include all Wisconsin hospitals, in order to shed light on the difference between rural and urban hospital HIT adoption levels.
- Expand the study to include out-of-state hospitals, in order to determine whether the Wisconsin experience is characteristic or anomalous.